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The metallurgical quality of the produced cast iron is related to its chemical composition (mainly the content of C, Si, Mn, P, and S), or other monitored elements, alloying elements (Cr, Ni, Cu, K), in some cases showing elements (Pb, Sn, As, Sb, K). The chemical composition of cast iron is determined by the degree of saturation (Sc) or carbon equivalent (CE). Other factors influencing the quality of cast iron are the metallurgical conditions of production (melting and treatment) of cast iron and the rate of solidification in the mold. The mechanical properties of cast iron (Rm, HB, and E0) are closely related to its chemical composition. In addition to this common evaluation of cast iron, other quality criteria of gray cast iron are also used in practice. This is a comparison of the mechanical properties of the produced gray cast iron with the optimal values determined for the same degree of saturation (Sc). This chapter concerns assessments of the metallurgical quality of gray cast iron and the results of operational melting of synthetic gray cast iron with different charge compositions in the Slovak Foundry and its analysis. Metal working fluids (MWFs) provide important functions such as lubrication and cooling in the machining of metals. This book reviews the issues surrounding the use of fluids for cutting and grinding throughout the metal working process, from selection and testing to disposal. The book opens with chapters considering the mechanism and action, selection and delivery of MWFs to the machining zone before moving onto discuss the many issues surrounding MWFs during machining such as selection of the proper MWF, environmental concerns, supply methods, circulation and monitoring. The final chapters discuss the maintenance, replacement and disposal of MWFs. With its distinguished editors and international team of expert contributors, Metalworking fluids (MWFs) for cutting and grinding is an invaluable reference tool for engineers and organizations using metal cutting/machining in the manufacturing process as well as machine designers/manufacturers and machining fluid/chemical suppliers. Chapters consider the mechanism and action, selection and delivery of MWFs to the machining zone Environmental concerns, supply methods, circulation and monitoring are also discussed Written by distinguished editors and international team of expert contributors This book deals with various science and technology factors that need careful consideration in producing a casting. It consists of 11 chapters contributed by experts in their respective fields. The topics include simulation of continuous casting process, control of solidification of continuous castings, influence of mold flux in continuous casting, segregation in strip casting of steel, developments in shell and solid investment mold processes, innovative pressure control during filling of sand molds, fracture toughness specifically of castings, permanent molding of cast iron, wear resistant castings and improvement of accuracy in estimating graphite nodularity in ductile iron castings. This book provides a solid overview of the important metallurgical concepts related to the microstructures of irons and steels, and it provides detailed guidelines for the proper metallographic techniques used to reveal, capture, and understand microstructures. This book provides clearly written explanations of important concepts, and step-by-step instructions for equipment selection and use, microscopy techniques, specimen preparation, and etching. Dozens of concise and helpful "metallographic tips" are included in the chapters on laboratory practices and specimen preparation. The book features over 500 representative microstructures, with discussions of how the structures can be altered by heat treatment and other means. A handy index to these images is provided, so the book can also be used as an atlas of iron and steel microstructures. Cast Iron: Physical and Engineering

Properties describes the importance of iron and its properties, as well as the process of casting in the different fields of engineering. The book covers topics such as the mechanical, physical, and electrical properties of iron and the different tests under which it is subjected; the effects of heat treatment on gray cast iron; and the resistance of cast iron to heat and stress. Topics also include internal casting stresses; cast iron beams and columns; and the application of the specifications for cast iron to design. The text is recommended for metallurgists and engineers who are interested in cast iron, its properties, and its uses in construction. In general, metallic alloys are the interdisciplinary subject or even an area that cover physics, chemistry, material science, metallurgy, crystallography, etc. This book is devoted to the metallic alloys. The primary goal is to provide coverage of advanced topics and trends of R 11th International Symposium on the Science and Processing of Cast Iron Selected, peer reviewed papers from the 11th International Symposium on the Science and Processing of Cast Iron (SPCI-XI), September 4-7, 2017, Jönköping, Sweden The Foseco Ferrous Foundryman's Handbook is a practical reference book for all those concerned with making castings in any of the commonly used alloys, by any of the usual moulding methods. International SI units are used throughout, but in almost all cases conversions to the more familiar Metric and Imperial units are given. Wherever possible, Casting Alloy Specifications include equivalent specifications for several countries as well as international specifications. Individual chapters cover the casting of light alloys, copper-based alloys, all types of cast-iron and steel. For each group of alloys, specifications and typical applications are described, together with details of melting practice, metal treatment and casting practice. Sand moulding materials, including green sand and chemically bonded sands are also included. The demand for cast iron components, with weights ranging from a few kilograms to several tons, has increased significantly in recent years, both for technical and economic reasons. In fact, the lower cost compared to other alloys, and the good castability, which allow one to obtain near-net shape components in as-cast conditions, and the mechanical properties that can be obtained, are just some of the motivations that attract mechanical designers. However, correct design requires a good knowledge of the intrinsic correlation among alloy chemical composition, process parameters, microstructure (with casting defects) and mechanical properties. This book is aimed at collecting excellent and recent research experimental and theoretical works in this field. Technological (say, wear resistance and weldability) and mechanical properties (say, Young modulus, static and fatigue strength) of different grades of cast irons, ranging from solution strengthened ferritic ductile iron to compacted graphite iron as well as white and nodular cast irons, are correlated with the alloy chemical composition, process parameters and casting dimension. This handbook gathers, reviews and concisely presents the core principles and varied technology involved in processing ferroalloys. Background content in thermodynamics, kinetics, heat and mass transfer is accompanied by an overview of electrical furnaces theory and practice as well as sustainability issues. The work includes detailed coverage of the major technologies of ferrosilicon, ferronickel, ferromolybdenum, ferrotungsten, ferrovanadium, ferromanganese and lesser known minor ferroalloys. Distilling the results of many years' experience in ferroalloys, Michael Gasik has assembled contributions from the worlds' foremost experts. The work is therefore a unique source for scientists, engineers and university students, exploring in depth an area which is one of the most versatile and increasingly used fields within modern metallurgy. All-in-one source for the major ferroalloys and their metallurgical processing technologies, cutting research time otherwise spent digging through old handbooks or review articles. In-depth discussion of the C, Si, Al-reduction, groups II-VIII of the periodic table, supporting analysis of metallurgical processing. Contemporary coverage includes environment and energy saving issues. This textbook focuses on cast irons, the second material in production and consumption after steel. The authors describe the Fe-C stable and metastable diagrams from the physical-chemical metallurgy point of view. The main properties of cast irons are presented and justified for all kinds of cast irons: low cost, excellent castability, mechanical properties depending on the graphite morphology (gray irons) and high wear resistance (white irons). The physical metallurgy of highly alloyed cast irons is also described, particularly that one of those used as a consequence of their abrasion, corrosion and heat resistance. The book presents exercises, problems and cases studies, with different sections dedicated to the molding practice. The book finishes with the production cast irons in the cupola furnace. This concise textbook is particularly of interest for students and

engineers that work in industries related to cast irons. The demand for cast iron components, with weights ranging from a few kilograms to several tons, has increased significantly in recent years, both for technical and economic reasons. In fact, the lower cost compared to other alloys, and the good castability, which allow one to obtain near-net shape components in as-cast conditions, and the mechanical properties that can be obtained, are just some of the motivations that attract mechanical designers. However, correct design requires a good knowledge of the intrinsic correlation among alloy chemical composition, process parameters, microstructure (with casting defects) and mechanical properties. This book is aimed at collecting excellent and recent research experimental and theoretical works in this field. Technological (say, wear resistance and weldability) and mechanical properties (say, Young modulus, static and fatigue strength) of different grades of cast irons, ranging from solution strengthened ferritic ductile iron to compacted graphite iron as well as white and nodular cast irons, are correlated with the alloy chemical composition, process parameters and casting dimension. Volume is indexed by Thomson Reuters CPCI-S (WoS). Cast iron, one of the oldest alloys known to the human race is still finding new applications in spite of fierce competition from lighter alloys as well as from the most recently discovered new materials. From its earliest beginnings in around 500BC, cast iron underwent little change until the revolutionary development of spheroidal-graphite (ductile) iron in 1949. This discovery was the spark that ignited a series of unexpected transmogrifications of that ancient alloy. After three centuries cast iron is still, surprisingly, widening its scope of application; thanks to the dedicated research work that has been carried out over the past few decades. The book comprises three parts. Part 1 gives a historical description of the development of ironworking techniques since the earliest times. Part 2 is the core of the book and deals with the metallurgical basis of microstructures, with four main themes: phase diagrams, solidification processes, diffusion, and solid state phase transformations. Part 3 begins by an introduction to steel design principles. It then goes on to consider the different categories of steels, placing emphasis on their specific microstructural features. Finally, a comprehensive reference list includes several hundred pertinent articles and books. The book is the work of a single author, thus ensuring uniformity and concision. It is intended for scientists, metallurgical engineers and senior technicians in research and development laboratories, design offices and quality departments, as well as for teachers and students in universities, technical colleges and other higher education establishments. Cast iron offers the design engineer a low-cost, high-strength material that can be easily cast into a wide variety of useful, and sometimes complex, shapes. This handbook from ASM covers the entire spectrum of one of the most widely used and versatile of all metals. Cast Iron Technology presents a critical review of the nature of cast irons. It discusses the types of cast iron and the general purpose of cast irons. It also presents the history of the iron founding industry. Some of the topics covered in the book are the description of liquid metal state; preparation of liquid metal; process of melting; description of cupola melting and electric melting methods; control of composition of liquid metal during preparation; description of primary cast iron solidification structures; and thermal analysis of metals to determine its quality. Solidification science and the fundamentals of heat treatment are also discussed. An in-depth analysis of the hot quenching techniques is provided. The graphitization potential of liquid iron is well presented. A chapter is devoted to microstructural features of cast iron. The book can provide useful information to iron smiths, welders, students, and researchers. While there are several books on market that are designed to serve a company's daily shop-floor needs. Their focus is mainly on the physically making specific types of welds on specific types of materials with specific welding processes. There is nearly zero focus on the design, maintenance and troubleshooting of the welding systems and equipment. Applied Welding Engineering: Processes, Codes and Standards is designed to provide a practical in-depth instruction for the selection of the materials incorporated in the joint, joint inspection, and the quality control for the final product. Welding Engineers will also find this book a valuable source for developing new welding processes or procedures for new materials as well as a guide for working closely with design engineers to develop efficient welding designs and fabrication procedures. Applied Welding Engineering: Processes, Codes and Standards is based on a practical approach. The book's four part treatment starts with a clear and rigorous exposition of the science of metallurgy including but not limited to: Alloys, Physical Metallurgy, Structure of Materials, Non-Ferrous Materials, Mechanical Properties

and Testing of Metals and Heat Treatment of Steels. This is followed by self-contained sections concerning applications regarding Section 2: Welding Metallurgy & Welding Processes, Section 3: Nondestructive Testing, and Section 4: Codes and Standards. The author's objective is to keep engineers moored in the theory taught in the university and colleges while exploring the real world of practical welding engineering. Other topics include: Mechanical Properties and Testing of Metals, Heat Treatment of Steels, Effect of Heat on Material During Welding, Stresses, Shrinkage and Distortion in Welding, Welding, Corrosion Resistant Alloys-Stainless Steel, Welding Defects and Inspection, Codes, Specifications and Standards. The book is designed to support welding and joining operations where engineers pass plans and projects to mid-management personnel who must carry out the planning, organization and delivery of manufacturing projects. In this book, the author places emphasis on developing the skills needed to lead projects and interface

with engineering and development teams. In writing this book, the book leaned heavily on the author's own experience as well as the American Society of Mechanical Engineers (www.asme.org), American Welding Society (www.aws.org), American Society of Metals (www.asminternational.org), NACE International (www.nace.org), American Petroleum Institute (www.api.org), etc. Other sources includes The Welding Institute, UK (www.twi.co.uk), and Indian Air force training manuals, ASNT (www.asnt.org), the Canadian Standard Association (www.cas.com) and Canadian General Standard Board (CGSB) (www.tpsgc-pwgsc.gc.ca). Rules for developing efficient welding designs and fabrication procedures Expert advice for complying with international codes and standards from the American Welding Society, American Society of Mechanical Engineers, and The Welding Institute(UK) Practical in-depth instruction for the selection of the materials incorporated in the joint, joint inspection, and the quality control for the final product.